(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 890 335 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.01.1999 Bulletin 1999/02

(51) Int. Cl.[6]: **A47L 9/18**

(21) Application number: **98112228.6**

(22) Date of filing: **02.07.1998**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **10.07.1997 IT UD970121**

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(54) Separator unit for liquid bath vacuum cleaners

(57) Separator unit for liquid bath vacuum cleaners used for separating from the introduced air the particles of dirt and/or dust sucked with drops of water, the separator unit comprising at least a hollow body shaped like a truncated cone assembled on the drive shaft (11) of the intake assembly of the vacuum cleaner, the hollow body including laterally a plurality of longitudinal slits (21) to discharge the introduced particles of dirt/dust and/or drops of liquid, the separator unit comprising a disk-shaped supporting element (13) axially holed and keyed onto the drive shaft (11), the supporting element (13) being coupled with the hollow body (12) by means of a peripheral edge (17) with a tooth (17a) to couple with the upper edge of the hollow body (12), the supporting element (13) including a plurality of radial apertures (24) for the passage of the ingested air and a plurality of discharge slits (27) made radially on the portion of the peripheral edge (17) which defines the tooth (17a).

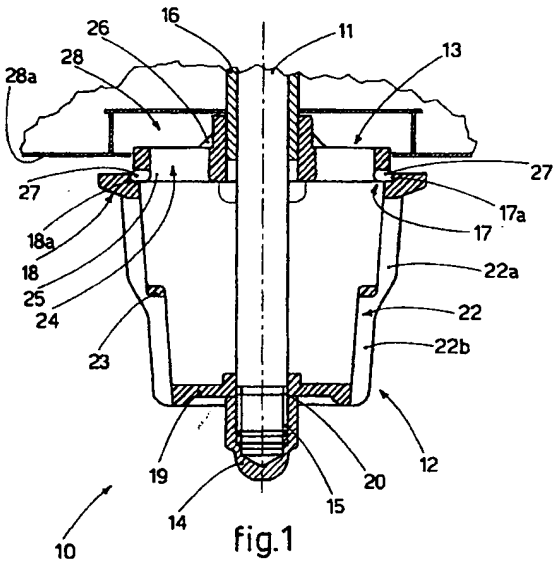

fig.1

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Description

FIELD OF THE INVENTION

This invention concerns a separator unit for liquid bath vacuum cleaners as set forth in the main claim. The separator unit is employed in liquid bath vacuum cleaners to separate particulates of dust and dirt from the ingested air.

BACKGROUND OF THE INVENTION

The state of the art includes liquid bath vacuum cleaners employed for cleaning, which comprise a box-like structure housing an intake assembly, a system with an air chamber, a rotary separator and a tank, open at the upper part, containing liquid, normally water.

The box-like structure includes an inlet aperture which communicates with the tank; the intake conduit engages with the said aperture.

The inlet aperture is normally made on the tank at a height above the level of the liquid contained therein and is orientated towards the liquid.

The separator is arranged facing above the tank and assembled on the drive shaft of the intake assembly; it substantially consists of a hollow body, generally shaped like a truncated cone, and includes at the sides longitudinal slits inclined according to the direction of rotation.

In this type of vacuum cleaner the particulates of dirt and dust which are picked up through the intake conduit are taken into the tank and most of them mix with the liquid and are retained therein.

On the contrary, the particulates of dirt and dust which stray in the tank, together with droplets of liquid, are sucked up by the vacuum created by the intake assembly and enter inside the hollow body of the rotary separator through the longitudinal slits thereof.

The centrifugal force deriving from the rotation of the separator generates a phenomenon of coalescence between the particulates of dirt and dust and the drops of water which are forced towards the outside, separating from the air which, on the contrary, is drawn upwards, is impelled into the air chamber system and discharged into the outside environment through apertures made for this purpose.

The centrifugal force also causes the agglomerated particulates of dirt, dust and liquid to be discharged from the separator through the longitudinal slits; the particulates then fall into the tank of liquid due to their own weight.

However, some of the particulates remain inside the hollow body of the separator and are either deposited on the walls thereof or they filter into the coupling zone between the separator and the drive shaft, which causes an encrustation of dirt to form.

This situation entails that the vacuum cleaner needs frequent maintenance and, in the long term, it can lead to a reduction in the efficiency of the separator or damage to the intake assembly.

The present Applicant has designed, tested and embodied this invention to overcome the shortcomings of the state of the art and to obtain further advantages.

SUMMARY OF THE INVENTION

The invention is set forth and characterised in the main claim, while the dependent claims describe variants of the idea of the main embodiment.

The purpose of the invention is to provide a rotary separator assembly for liquid bath vacuum cleaners which will give a better discharge of the agglomerated particulates of liquid, dirt and dust once these particulates have been separated from the air.

The separator assembly according to the invention comprises a hollow body which is constrained to the drive shaft by means of a disk-shaped and axially holed supporting element.

The supporting element is keyed onto the drive shaft and includes a peripheral edge which couples with the upper edge of the hollow body.

The supporting element also includes a plurality of apertures arranged radially which allow the air which is to be discharged to pass from the hollow body of the separator to the air chamber system.

According to the invention, on at least part of the perimeter of the supporting element there are discharge slits, made in correspondence with the peripheral edge, to discharge the residual particulates of dirt, dust and liquid from inside the separator assembly.

In a preferential embodiment, the discharge slits are arranged in correspondence with the edge where the supporting element rests on the hollow body of the separator assembly, so as to allow the complete discharge of the particulates of dirt and dust which might remain in the area of separation between the supporting element and the hollow body.

According to a variant, the discharge slits are arranged radially in a position mating with the radial apertures.

According to another variant, the discharge slits have at least the inlet mouth connected with the peripheral edge of the supporting element and/or the radial apertures.

According to a further variant, the discharge slits are open at the upper part.

In the separator according to the invention the rotation action causes the particulates of dust and dirt to coalesce with the little drops of liquid which has been ingested.

These particulates, agglomerated with the liquid, are separated from the air and thrust towards the outside of the hollow body of the separator assembly due to the effect of the centrifugal force, while the "filtered" air is forced inside the air chamber system through the radial apertures of the supporting element and then dis-

charged into the outer environment.

The agglomerated particulates of dirt, dust and liquid which have not been expelled and which tend to rise up along the walls of the hollow body, are instead discharged outside the separator assembly through the discharge slits, again due to the effect of the centrifugal force generated by the rotation of the separator assembly itself.

This gives a better functioning of the separator assembly and substantially prevents the formation of encrustations and deposits of the agglomerated particulates which may lead to break-downs or malfunctions of the vacuum cleaner.

Moreover, there is a reduced need to maintain and clean the vacuum cleaner and a reduced risk of wear and deterioration of the functional components thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

The attached Figures are given as a non-restrictive example and show a preferential embodiment of the invention as follows:

Fig. 1	is a section drawing of the separator assembly according to the invention;
Fig. 2	is a front view of the hollow body of the separator shown in Fig. 1;
Fig. 3	shows a view from "D" of Fig. 2;
Fig. 4	shows a section from "A" to "A" of Fig. 3;
Fig. 5	shows a view from above of the supporting element of the separator assembly of Fig. 1;
Fig. 6a	shows a section from "B" to "B" of Fig. 5;
Fig. 6b	shows a section from "C" to "C" of Fig. 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The separator assembly 10 according to the invention for liquid bath vacuum cleaners is shown in section in Fig. 1.

The separator assembly 10 is assembled on the drive shaft 11 of the intake assembly of the vacuum cleaner and faces above a tank to contain the liquid (not shown here).

The separator assembly 10 consists of a hollow body 12 shaped like a truncated cone and of a mating disk-shaped supporting element 13 by means of which the hollow body 12 is constrained to the drive shaft 11.

In this case, the hollow body 12 is constrained to the drive shaft 11 at the upper part by means of the supporting element 13 and at the lower part by means of a screw-type attachment element 14.

To be more exact, the supporting element 13 is keyed onto the drive shaft 11, in this case by means of a coupling bush 16, and includes a peripheral edge 17 comprising a tooth 17a which can be coupled through contact with a shaping 18a made on the upper edge 18 of the hollow body 12 (Fig. 1).

In correspondence with the lower face 19, the hollow body 12 includes an axial hole 20 inside which the drive shaft 11 is inserted.

In its end portion which emerges from the axial hole 20, the drive shaft 11 includes a thread 15 onto which the screw-type attachment element 14 is anchored, in order to complete the coupling of the drive shaft 11 and the hollow body 12.

The longitudinal slits 21 of the hollow body 12, made along the lateral surface of the latter, are defined in this case by ribs 22 which develop lengthwise in two non-aligned segments 22a and 22b, defining an intermediate step-like portion facing towards the cavity of the hollow body 12.

The step-like portion defines a first intake zone with a reduced diameter and a second zone, with a wider diameter, for the discharge of the liquid mixed with dust and dirt.

The hollow body 12 also includes a stiffening ring 23 arranged in an inner position with respect to the upper segment 22a and substantially above the lower segment 22b.

The supporting element 13 includes a plurality of radial apertures 24 in this case shaped like a rounded trapezoid.

The radial apertures 24 are separated by walls 25 equipped with stiffening fins 26.

On the portion of peripheral edge 17 cooperating with the tooth 17a, there are also a plurality of discharge slits 27, each of which connects a relative radial aperture 24 with the outside.

In this case, the discharge slits 27 have lateral walls 27a which connect with the relative radial apertures 24 so as to define a lead-in mouth to encourage a better discharge of the residual particulates and drops.

According to another embodiment, the discharge slits 27 are open at the upper part.

The discharge slits 27 are arranged between the upper edge 18 of the hollow body 12 and the lower wall 28a of the air chamber system 28 of the vacuum cleaner (Fig. 1).

When the vacuum cleaner is working, the flow of air generated by the intake assembly passes through the separator assembly 10 taking with it, inside the hollow body 12 of the separator, the particulates of dust and dirt straying inside the underlying tank containing liquid, and small drops of the liquid itself.

These particulates and the small drops of liquid enter inside the hollow body 12 mainly through the lower portion of the longitudinal slits 21 and, due to the effect of the centrifugal force, coalesce and separate from the air at the same time.

Moreover, the centrifugal force itself causes them to be expelled from the hollow body 12 through the longitudinal slits 21, particularly through the upper portion thereof.

The air which has been purified of these particulates of dirt and dust and the drops of liquid is on the

contrary sucked upwards and delivered to the air chamber system 28, to be discharged into the outer environment, passing through the radial apertures 24 of the supporting element 13.

The residual particulates of dirt and dust together with the drops of liquid which have not been expelled, due to the combined effect of the centrifugal force and the vacuum generated by the intake assembly, tend to rise up along the ribs 22 and then through the walls of the radial apertures 24; then they are discharged though the discharge slits 27 and fall downwards and substantially into the underlying liquid.

Claims

1. Separator unit for liquid bath vacuum cleaners employed to separate from the ingested air the particulates of dirt and/or dust entrained with drops of water, the separator unit comprising at least a hollow body shaped like a truncated cone assembled on the drive shaft (11) of the intake assembly of the vacuum cleaner, the hollow body including laterally a plurality of longitudinal slits (21) to discharge the ingested particulates of dirt/dust and/or drops of liquid, the separator unit being characterised in that it comprises a disk-shaped supporting element (13) axially holed and keyed onto the drive shaft (11), the supporting element (13) being coupled with the hollow body (12) by means of a peripheral edge (17) with a tooth (17a) to couple with the upper edge of the hollow body (12), the supporting element (13) including a plurality of radial apertures (24) for the passage of the ingested air and a plurality of discharge slits (27) made radially on the portion of the peripheral edge (17) which defines the tooth (17a).

2. Separator assembly as in Claim 1, characterised in that the discharge slits (27) are arranged in correspondence with the radial apertures (24).

3. Separator assembly as in Claim 1, characterised in that the inner side of the discharge slits (27) is connected with the relative radial aperture (24).

4. Separator assembly as in any Claim hereinbefore, characterised in that the discharge slits (27) are open at the upper part.

5. Separator assembly as in any Claim hereinbefore, characterised in that the ribs (22) defining the longitudinal slits (21) have a discontinuous longitudinal development comprising an upper segment (22a) and a lower segment (22b) separated by an intermediate step-like portion facing towards the cavity of the hollow body (12).

6. Separator assembly as in Claim 5, characterised in that between the upper segment (22a) and the lower segment (22b) of the rib (22) there is a stiffening ring (23).

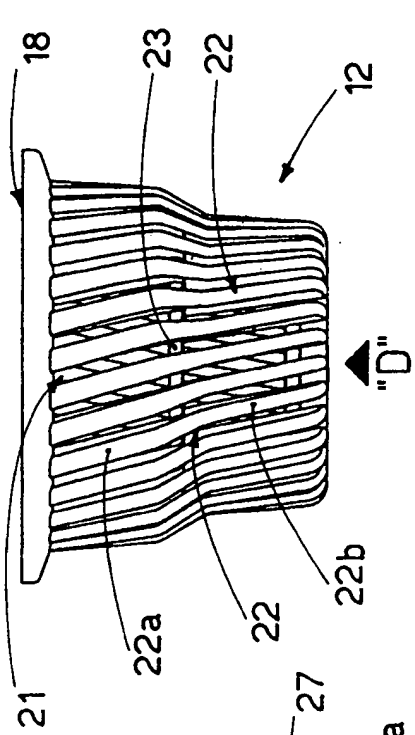

fig.2

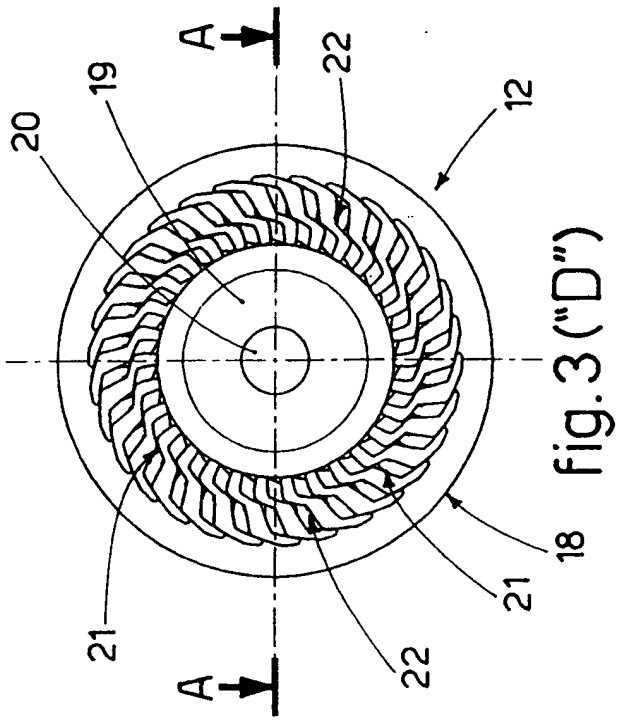

fig.3 ("D")

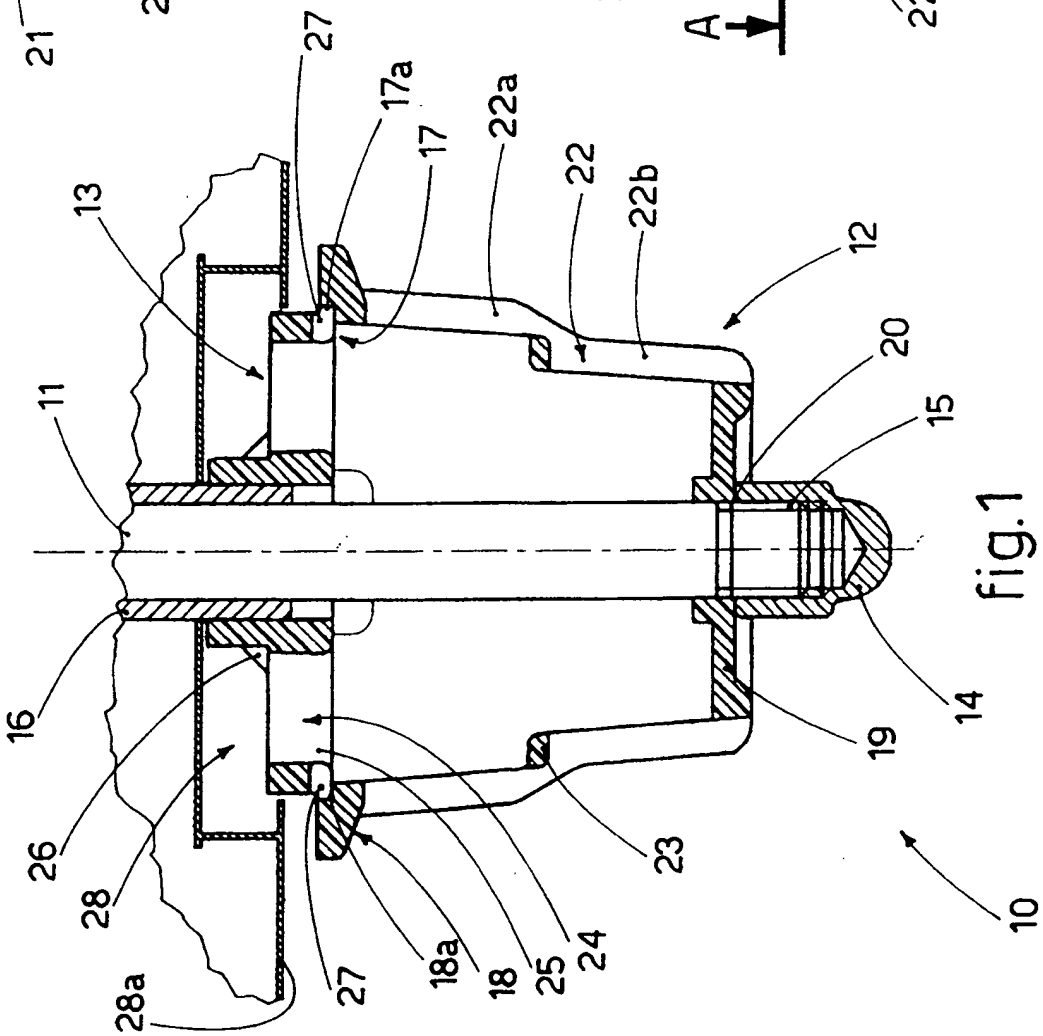

fig.1

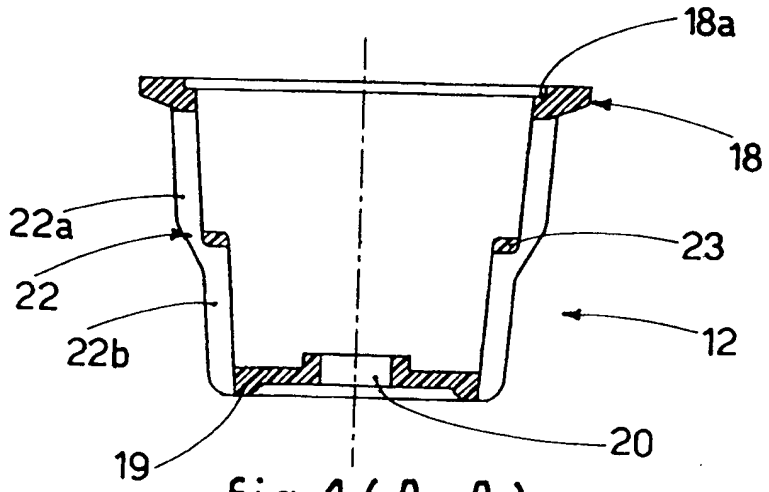

fig.4 (A-A)

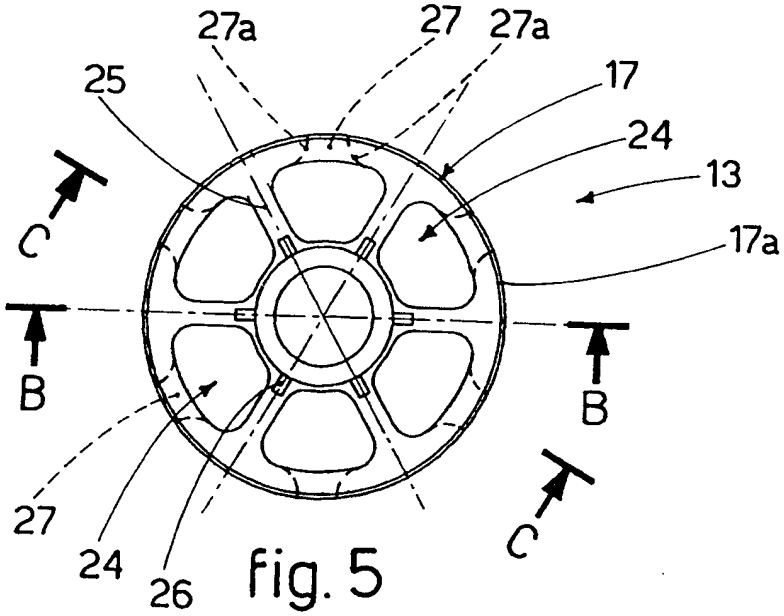

fig. 5

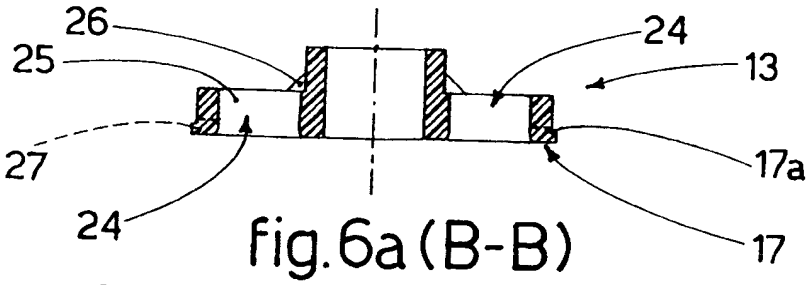

fig.6a (B-B)

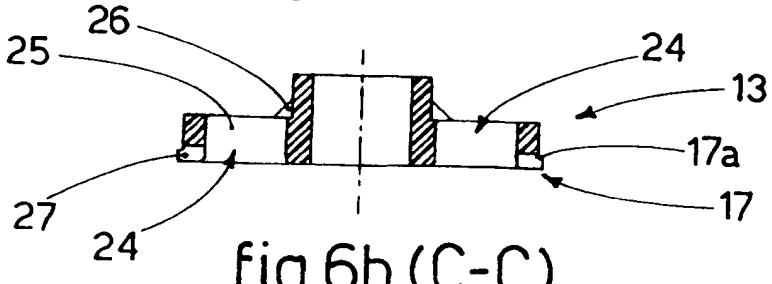

fig.6b (C-C)

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EUROPEAN SEARCH REPORT

Application Number
EP 98 11 2228

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	WO 92 03210 A (REXAIR INC) 5 March 1992 * page 7, line 24 - page 15, line 15 * * page 18, line 5 - page 21, line 17 * * page 23, line 17-38 * * page 25, line 22-35; figures 1-13 *	1,2,5 3,4,6	A47L9/18

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	21 October 1998	Laue, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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